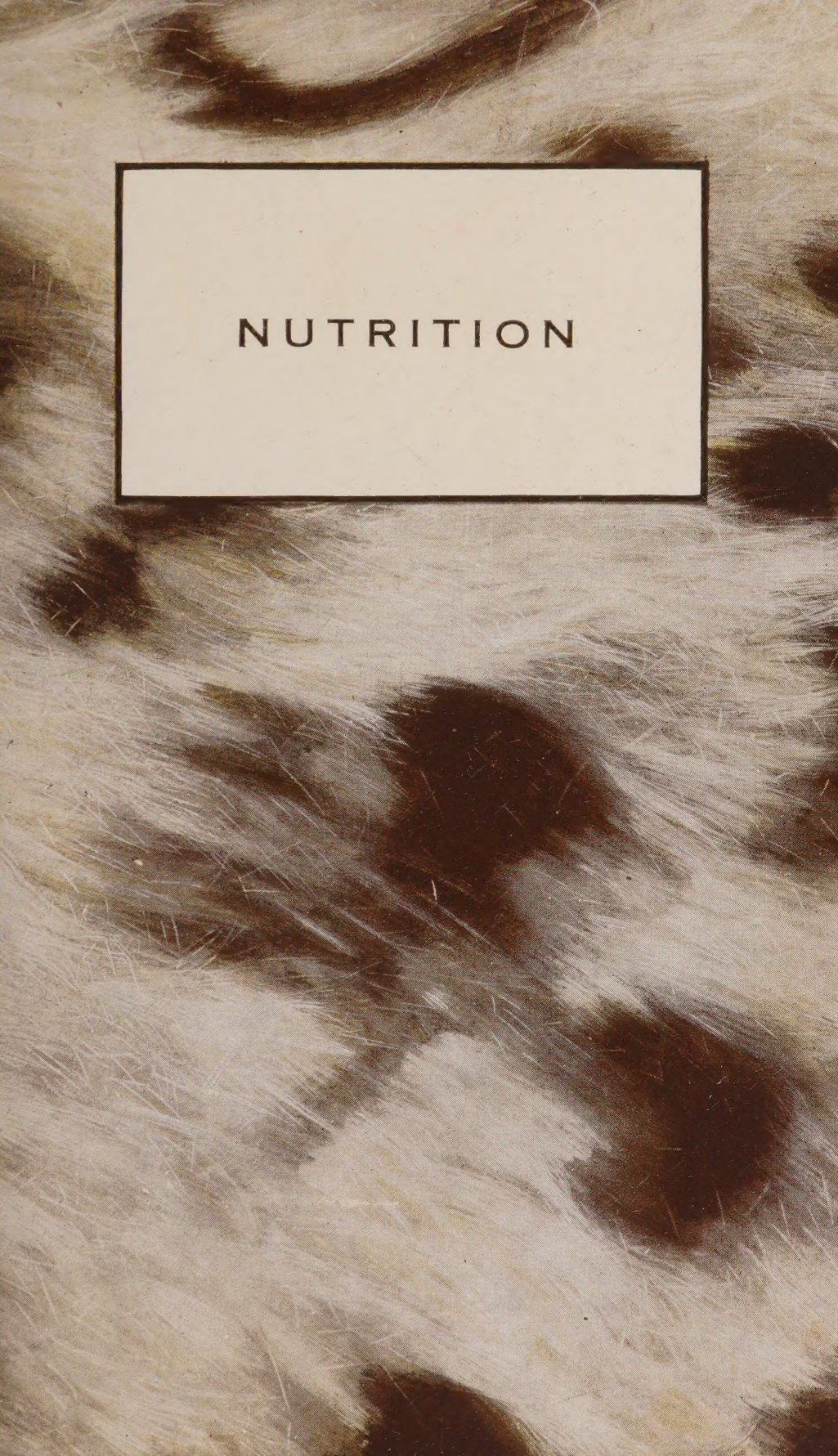
NUTRITION

Epithelium degeneration due to Vitamin A deficiency. The illustration shows degeneration of the mucous membrane of the trachea

Nerve degeneration due to Vitamin B deficiency. The illustration shows degeneration with proliferation of Schwann's sheath

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Father bringing his child to be reared and educated by the Centaur Cheiron, whose status in the healing art is commemorated in the plant names Cheironium and Centaurea.

Date: From prehistoric times. The vase, c. 500 B.C.

For the Medical Profession only

NUTRITION

THE advances made of recent years in the science of nutrition have clearly demonstrated that, even though sufficient food is ingested to satisfy bodily requirements, it does not necessarily follow that the ingested food contains adequate nourishment. The result of such faulty nutrition is ill-health in general and a prevalence of deficiency diseases, formerly attributed to heredity or environment or to a combination of the two. Rickets is a typical example of such a condition. Once widespread owing to the use of various substitutes for milk, it is now comparatively rare; a fact which may be said to be due to the increasing tendency to supplement the diets of infants with cod liver oil. Rickets, therefore, like many other established deficiency diseases, has been added to the class of easily preventable diseases by the discovery of the vitamins and by advances made as to their nature. The importance of vitamins in the diet of every child, especially if artificially-fed, cannot be over-estimated. A consideration of the effects of a deficiency of food factors indicates that it is essential to supplement the dietary of every artificially-fed child with some vitamin-containing substance.

Growth of Knowledge

The newer knowledge of nutrition to-day may be claimed to be one of the greatest advances in medical science, but it was only in the first 10 years of the present century that there was a revival of interest in the problems of nutrition.

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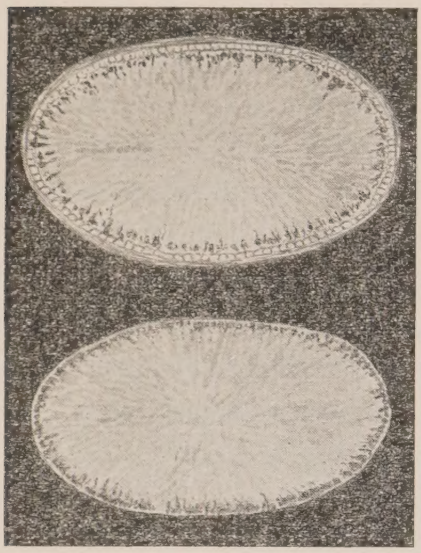
At that time investigations by new and more complex experimental methods were initiated in increasing numbers. Prior to these the work of physiologists and chemists had consisted only in the separation of the living animal or plant into its larger components of proteins, known to be essential for growth and for replacing "wear and tear," and into fats and carbohydrates, valued solely as providers of heat and energy, and in the study of the chemistry of these groups. Later, the fats and lipins and the process of saponification were studied and the relation of the simple sugars to the more complex carbohydrates was recognised.

The New Era

It was, however, during the present century that there began a new era in the knowledge of the nutritive needs of the body and the essential characters of foodstuffs. It is difficult now, in the light of present knowledge, to find a reason why the belief that the dietary value of foodstuffs rested solely on a chemical knowledge of proteins, fats and carbohydrates; or why it should have been accepted for so long without experimental proof especially in face of much evidence to the contrary. But the didactic influence of the chemists continued to the end of the nineteenth century.

There had been for many years abundant evidence of the fact that a diet may be sufficient and of appropriate chemical constitution and yet fail to meet the full nutritional needs of man. It had been known for centuries that certain foods produced scurvy in soldiers,

sailors and inmates of prisons. It was equally well known that the addition of fresh fruits or certain fresh vegetables to the diet would cure the condition or prevent its recurrence. No one had thought to investigate, by experiment, the reason why some diets, otherwise complete, should induce disease, and why certain foods protected against such conditions, even when constituting only a fraction of the total diet. Beri-beri had been known from remote times, and in several instances its cure had been observed to lie in a freshening and varying of the diet. In 1912, a year of outstanding importance in vitamin research, Hopkins published the results of a detailed investigation which gave conclusive experimental proof of the existence of unknown and indispensable substances in the diet. He demonstrated that laboratory animals could not live on a purified, well-balanced diet of correct energy value, unless a small quantity of fresh milk was added each day, thus confirming the earlier experiment of Lunin. Hopkins termed the necessary dietary substances "accessory food factors." Even as early as 1906 he had written with reference to the possible missing nutritive principles in the diet,



Above: rice grain, with husk removed but pericarp intact.

Below: rice grain, with the aleurone layer, which contains the essential vitamin, partly removed in the process of polishing.

(Milling completely removes the aleurone layer.)

but it was the publication of his work in 1912 that marked the beginning of a full and proper appreciation of these dietary factors that we now term vitamins.

Vitamins: Their Place in Dietetics

The story of the discovery and subsequent investigation of the vitamins is one which holds an unusual degree of interest. The evolution of this phase of nutrition has exerted a marked influence on modern medicine. To the recognised concept that disease may be caused by deleterious agents such as bacteria and toxins, has been added the knowledge that disease may be due to simple deficiencies of indispensable dietary agents or to their inefficient utilisation by the body.

The important advances that have been made in the identification and preparation of the vitamins, the recently acquired knowledge of their constituents, as well as their physiological activity, and the new light that has been shed upon the factors modifying their presence or absence in food, clearly indicate that the determination of the essential components of a diet and the quantities of all its constituents needed in varying conditions are the problems of modern dietetics. Therefore, practical dietetics to-day requires not only a knowledge of the composition of a normal diet, but also, to ensure adequate nutrition, a complete understanding of the conditions under which foods are produced. For instance, recent research has shown that the various leaves of a cabbage differ in mineral content and it is estimated that the outermost leaf may contain approximately 30 times as

much calcium as an inner leaf. Further, it has been noted that the nutritive value of vegetables varies according to the soil, and it is said that the content of Vitamin B is affected by the type of manure in which the plant is grown.* The physiological effects of accessory food factors must also be considered in perfecting the diet, and the importance of this has been indicated by a Swedish investigator, who claims that slight deficiencies of Vitamin C lead to a certain weakening of capillaries. It is therefore reasonable to suppose that the susceptibility to hæmorrhage may vary according to the amount of Vitamin C; in fact, some observers† have reported good results in the treatment of hæmorrhage with ascorbic acid.

Importance of Dietary Adjuncts

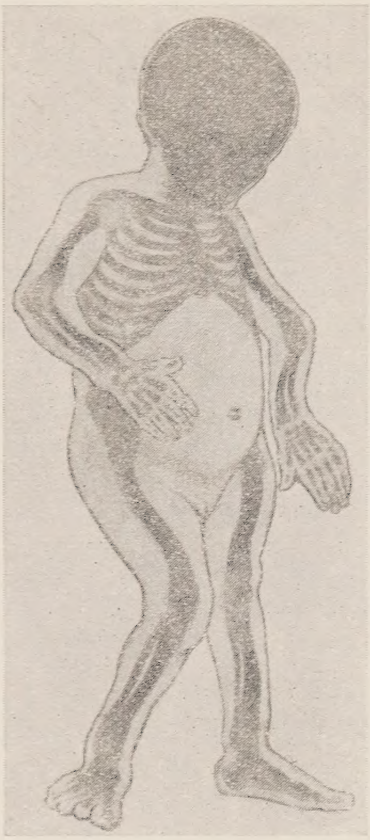
Avitaminosis, either potential or actual, may result from a limited or restricted diet, unless the significance of the vitamins, as well as an adequate intake of mineral salts, proteins, fats and carbohydrates is fully appreciated and understood. Especially is this the case in the diet of an artificially-fed child and it is therefore essential to supplement the dietary with some anti-rachitic. The problem is simplified by prescribing fresh milk or butter and fruit juices, together with cod liver oil, for its Vitamins A and D, thus thoroughly rebuilding the diet and ensuring adequate vitamin content.

Inasmuch as cod liver oil, fresh fruits and sunlight benefit the young and growing child, so the addition to the diet of small doses of iron is another important factor.

* *The Lancet*, I : 640 (1933).

† *Lancet*, II : 1285 (1935); *Münch. med. Woch.*, 1935 : *82:* 263.

Even when all other essential constituents of a diet are present, there is abundant evidence to show that serious detrimental effects on parts of the body may result from iron deficiency. Anæmia, growth failure and general loss of weight are the chief results in such cases. It is important to realise that one of the chief reasons for the occurrence of nutritional anæmia in infants is the deficiency of iron in the milk, so that the addition of small doses of iron to the diet of the growing child is of particular value in preventing anæmia of early infancy. Therefore, as the human infant has no large store of iron and receives very little in its food, it has been advocated that every baby, whether breast- or artificially-fed, for the first six to nine months of its life will benefit considerably by the addition of iron to its diet.* Although for years nations have remained healthy on foods dictated by experience, nevertheless it must be clear that it is the discovery of the vitamins that has enabled the changes brought about by the milling of wheat, which deprives it of its vitamin content, and the composition of margarine, a synthetic, vitamin-free product, to be corrected.



Diagrammatic representation of the symptoms of rickets

* *British Medical Journal*, 1 : 742 (1933)

In many instances the physician is unable to ascertain the origin or mode of production of the various constituents of the diet of individual patients and is therefore faced with the problem of safeguarding the vitamin supply. A small daily ration of fresh fruits (Vitamin C) with 'KEPLER' COD LIVER OIL WITH MALT EXTRACT (Vitamins A, B and D) overcomes these difficulties, and in those cases in which the administration of iron is indicated 'KEPLER' COD LIVER OIL WITH MALT EXTRACT AND IRON IODIDE provides the physician with a reliable and effective medicament.

Another important point is that, even if the vitamin supply is adequate for the normal needs of an adult, it is evident that at certain periods, such as the ante-natal period, during lactation and during convalescence, increased vitamin supplies are most necessary.

Limitations of Vitamin Concentrates

Current medical literature indicates that most authorities consider it advisable to administer vitamin-containing products of established reputation, which possess, in addition, definite food value, rather than powerful medicaments of no nutritive value, the dangers of which, owing to indiscriminate use, are becoming more and more imminent as time goes on. It has been pointed out,* for instance, that young infants may have an idiosyncrasy to Vitamin D and that, therefore, the present day tendency to increase the Vitamin D potency of cod liver oil is undesirable and unnecessary. Vitamin concentrates must not be considered as substitutes for a good cod liver oil, but rather as medicaments of supplementary value. It has been shown that growth

* Lewis Thatcher, *The Lancet*, I, 20 (Jan.), 1936

and health depend very largely on nutritious foods, and that products of the laboratories should be reserved for the treatment of disease. Of the fish oils available, cod liver oil is far superior to all others. Even halibut liver oil must be regarded only as an important supplement to, rather than a substitute for, a good cod liver oil. The liver of the halibut is especially rich in Vitamin A, but considerable variation occurs in the amounts present, while the oil is relatively poor in Vitamin D. It is, therefore, necessary to reinforce its Vitamin D content by artificial means. Further, cod liver oil presents not only Vitamins A and D in requisite proportion and amount, but also an easily assimilable fat which constitutes a valuable food; this is absent in halibut liver oil in the quantities in which it is administered. If halibut liver oil were administered in doses sufficiently large to present any fat value, hypervitaminosis would soon be apparent and the results might be serious. Similarly, tuna oil is of little food value and is of such potency that, following its administration, undesirable after-effects are a constant danger unless it is used with extreme caution.

Nutrition and Anæmia

There is now no doubt that many anæmias are nutritional in origin, and the addition of iron and traces of copper to the diet will not only prevent its occurrence, but will effect a rapid cure if it is already present. Anæmia may be occasioned, directly or indirectly, by dietary deficiency and there is much evidence to suggest that a close association exists between vitamin deficiency and secondary anæmias. Certain important facts stand out, and among these the most striking is the inadequacy of the two staple articles in modern diet, namely, meat and cereals. Both muscle meat and the endosperm of seeds (white flour) possess negligible

supplies of any of the vitamins, although the glandular organs, such as the liver and kidneys, may be rich in them. Green leaves, when taken regularly in adequate amounts, with their rich vitamin content make up for the deficiency in cereal diet and, further, green vegetable food possesses a high mineral content which is supplementary to the low mineral content of seeds. By their vitamin and mineral content, therefore, green vegetables correct definite grave deficiencies in modern diet. It is realised also that the milling of grain and the removal of its Vitamin B content make it all the more necessary to obtain a vital supply of that factor from the other articles of diet. *(See illustration on page* 3.)

Milk as an article of diet is almost complete—except for iron—both in vitamin and mineral content, but even a diet of cereals and milk together is not totally adequate. Although most of the other important salts and vitamins, together with proteins, fats and carbohydrates, are present, it does not provide iron or Vitamin C. It must not be forgotten that the vitamin content and other important qualities of milk depend on the diet given to the animals. Nevertheless, the diet of cattle has in many instances become low in vitamins. The addition to the daily ration of a green vegetable food and of good milk and fruit goes far to supplement a diet consisting of muscle meat and cereals.

Advantages of Cod Liver Oil with Malt Extract

The routine use of cod liver oil and orange juice is thus established, but in order that the cod liver oil may successfully perform its important dual function of strengthening feeble subjects and of maintaining the bodily resistance of the individual to disease, it is necessary to eliminate the possibility of any obstacle inimical to its most beneficial

results. Often cases requiring frequent nutritional reinforcement manifest symptoms of digestive derangement. In these instances, cod liver oil not infrequently augments this trouble and its therapeutic effect is impaired. The necessity arises for a vehicle adequate to preserve untouched the properties of cod liver oil and simultaneously to make it palatable to the patient. Malt extract, which has high nutritive value, is the ideal vehicle for the administration of cod liver oil, and 'KEPLER' COD LIVER OIL WITH MALT EXTRACT is an invaluable aid to dietetic treatment. One advantage accruing from the addition of such an extract to cod liver oil lies in the elimination of nausea, a frequent reaction of some individuals to the taste of the oil as such. Parallel with this advantage may be placed the presence of the B Vitamins in the malt extract.

HARVESTING BARLEY

'KEPLER' MALT EXTRACT is prepared solely from the highest grade malted barley, and is at every stage of production under the most skilled scientific supervision.

It contains the important food-principles—carbohydrates, proteins, salts and Vitamin B complex—while non-essential material is eliminated.

Malt extracts of unusually high diastatic power have been shown to be correspondingly weak in the very important nutritive constituent maltose, while those overloaded with maltose lack the digestive properties due to a proper diastatic content.

'KEPLER' COD LIVER OIL WITH MALT EXTRACT is a food which contains natural nutrients of high dietetic and calorific value. It also presents in their *natural* form and association Vitamins A and D, in association with Vitamin B complex, in the same proportions in which they are provided by Nature.

Progress of Investigation

Careful investigation of the vitamins is at present being vigorously prosecuted by many workers. Ample chemical and physiological evidence has accumulated to indicate that the original water-soluble Vitamin B is in reality a complex and consists of several distinct chemical entities. For some time two of these factors, heat-labile Vitamin B_1 and heat-stable Vitamin B_2 or G, have been recognised. Recent work indicates the existence of other factors.

A further instance of the complexity of the vitamin problem, and the rapid advances which are being made in its investigation, is to be found in the newer knowledge concerning Vitamin D. Recent work has demonstrated the multiple nature of this indispensable dietetic principle. The

commonly held opinion that ergosterol is the only parent substance or provitamin D has been discredited by evidence emanating from several quarters. The rapid progress of investigation in this field is indicated by the fact that as many as eight forms of Vitamin D have been artificially prepared and some of them are stated to be related to cholesterol.*

Review of Present Knowledge

An excellent review of the present knowledge concerning the vitamins is available.† It is important to note that in it a principle is emphasised which is rapidly becoming the accepted practice as experience with the clinical use and therapeutic effects of vitamin products becomes more complete. The view is expressed that :—

"Too much emphasis cannot be placed on the value of giving vitamins in a natural state. This is particularly true in relation to the components of the Vitamin B complex. Crystalline preparations of Vitamin B_1 are of undoubted value in specific conditions, but because of the uncertainty of the number of components of the Vitamin B complex which are necessary for normal health, it seems wise to supplement in most cases, and except under conditions of experiment, the administration of the crystalline product with preparations such as brewers' yeast or wheat germ which contain all the essential components."

* Bills, C. E. : *J.A.M.A.*, 108 : 17 (Jan. 2), 1937.

† Wilder, R. M., and Wilbur, D. L. : *Arch. Int. Med.*, 59 : 512 (March), 1937.

The wisdom of this concept becomes apparent when the evidence in favour of administering vitamins in a natural state is subjected to close scrutiny. This applies not only to preparations containing the Vitamin B complex, but is especially evident in connexion with Vitamins A and D. The administration of cod liver oil for the purpose of providing adequate amounts of Vitamins A and D remains the method of choice despite the tendency to over-emphasise the importance of highly potent synthetic concentrates. In this connexion it is interesting to note that the Council on Foods of the American Medical Association recommends the daily administration to children of two teaspoonfuls of cod liver oil for a satisfactory intake of Vitamins A and D.

Value of Natural Food Products

The tendency to overlook the fact that it was largely the established empirical value of cod liver oil which led to an appreciation of vitamin values, and the tendency to obscure the essential importance of the presentation of vitamins in natural food products prompt the statement that, whenever there are indications that any vitamin is deficient in the diet, it is always advisable to administer a preparation such as 'KEPLER' COD LIVER OIL WITH MALT EXTRACT, since when one vitamin is deficient other vitamins are likely and almost certain to be deficient.

Vitamin Therapy

The following is a convenient classification of the vitamins according to their known characteristics :—

FAT-SOLUBLE A— The growth or anti-xerophthalmic vitamin. This vitamin is found in adequate proportion in 'Kepler' Cod Liver Oil. It is presented in concentrated form as 'TABLOID' CAROTENE.

FAT-SOLUBLE D— The anti-rachitic vitamin. This vitamin is also found in adequate proportion in 'Kepler' Cod Liver Oil, but in cases needing intensive treatment 'TABLOID' CALCIFEROL may be prescribed.

FAT-SOLUBLE E— Fertility or anti-sterility vitamin. This is present in wheat embryo and green leaves.

WATER-SOLUBLE B_1 OR VITAMIN F—Essential for growth: Deficiency leads to infantile beri-beri and polyneuritis and beri-beri in pigeons. This vitamin is present in 'Kepler' Malt Extract and is also presented in concentrated form as 'RYZAMIN-B.'

WATER-SOLUBLE B_2 OR VITAMIN PP, OR VITAMIN G—Together with B_6, the pellagra-preventing vitamin. This is also present in 'Kepler' Malt Extract.

WATER-SOLUBLE B_3, B_4, B_5—These are ill-defined growth factors.

WATER-SOLUBLE B_6—The anti-dermatitis vitamin.

WATER-SOLUBLE C— The anti-scorbutic vitamin. This is found in fresh vegetables and in orange or lemon juice, and is presented in concentrated form as 'TABLOID' ASCORBIC ACID.

(See also Chart on page 23)

Vitamin Content of Foods

The following list shows the distribution of vitamins in the commoner foods: + indicates vitamin present, ++ good source, +++ rich source. B refers to the complex "water soluble" B, B_1 and B_2 being used where these have been separately estimated:—

Foods	Vitamins Contained
Beef	B_1++, B_2++, E++
Mutton	B_1++, B_2++
Liver, Ox	A+++, B_1++, B_2+++, E++
,, Pig	A+++, B++, C++, D+, E++
Heart, Ox	B_1++
,, Pig	B+, E++
Sweetbreads	A+, B++
Cod Liver Oil	A+++, D+++
Fish Roe	A++, B_1+
Egg yolk, Hens'	A++, B_1++, B_2+, D+++, E++
Milk, Cows', fresh	(varies) A+, B_1+, B_2++, C+, D+, E+
Butter, pasture	A++, D++, E++
Cheese, American	
Cheddar	A++, B_2+
,, skim milk	A+
Lard	Vitamins absent
Wheat-flour, wholemeal	A+, B_1+, B_2+
,, white	Vitamins absent
Beans, haricot	B_1++
,, kidney	A+, B++
Peas, dried	A+, B_1++, B_2++, C+
Potatoes, uncooked	A+, B_1++, B_2+, C+++
Carrot, raw (old)	A++, B_1++, B_2+, C+
Cabbage, green, fresh	A++, B_1++, B_2++, C+++, E+
Lettuce, green	A++, B_1++, B_2+, C+++, E+++
Tomato	A++, B++, B_1+, B_2+, C+++
Grape Fruit and Lemon	A+, B+, C+++
Orange Juice	A+, B+, C+++, E+

British Medical Research Council's Report, 1932

Therapeutics of Cod Liver Oil with Malt Extract

Ante-Natal Use

There is considerable evidence to show that the Vitamin D content of the diet of the mother during gestation is of great importance in relation to the skeletal development of the fœtus. The offspring of a mother whose diet has been deficient in Vitamin D is often predisposed to rickets, of low general vitality and with teeth of poor development. Further, Mellanby has pointed out that most of the ordinary foodstuffs are so iodine-deficient that they do not afford sufficient supply for the mother to pass on to the developing embryo, with the result that the thyroids of the offspring become hyperplastic. During the ante-natal period the provision of a full Vitamin D supply in the diet, together with the beneficial iodine content of cod liver oil, is simplified by the use of 'Kepler' Cod Liver Oil with Malt Extract, supplemented, in extreme cases of Vitamin D deficiency, by daily doses of 'Tabloid' Calciferol.

The vitamin content and other qualities of the milk depend on the diet of the mother during lactation. The vitamins present in the milk vary quantitatively with the amounts in the diet. Breast-feeding is not an assurance against rickets or general hypovitaminosis unless the milk is complete in its vitamin content. The administration of 'Kepler' Cod Liver Oil with Malt Extract, in doses of one teaspoonful to one tablespoonful,

to the mother during lactation is a safeguard the physician may adopt with good results. In some cases it may be thought necessary to add a daily dose of 'Tabloid' Calciferol. The anti-scorbutic factor (Vitamin C) is provided by a daily addition of fruit or 'Tabloid' Ascorbic Acid to the diet.

During Lactation

During lactation, the requirements of the mother in Vitamin B are several times greater than at other times. What previously may have been a bare sufficiency of Vitamin B in the diet becomes, during lactation, a definite deficiency. 'Kepler' Malt Extract or 'Ryzamin-B' is, therefore, of special value at this time. *(See also* CALCIUM PREPARATIONS, *pages* 24 *to* 26.).

Reduced facsimile

All 'Kepler' Cod Liver Oil is tested for Vitamin A by the most practicable method, and the results are confirmed from time to time by the growth test on rats. All 'Kepler' Cod Liver Oil is tested for its content of Vitamin D in accordance with the method of the Medical Research Council. The B vitamins are invariably present in 'Kepler' Malt Extract.

'Kepler' Cod Liver Oil with Malt Extract has been kept at room temperature for 12 months, after the removal of some of the contents of the bottle, without any evidence of decline in vitamin activity.

TRADE MARK 'KEPLER' MALT COMBINATIONS

For use in various nutritional disorders, in addition to 'Kepler' Cod Liver Oil with Malt Extract, the following 'Kepler' combinations are also available :—

TRADE MARK 'KEPLER' COD LIVER OIL WITH MALT EXTRACT AND IRON IODIDE

When combined with 'Kepler' Cod Liver Oil with Malt Extract, iron iodide is protected from rapid oxidation, the malt extract serving as an efficient vehicle. The addition of small doses of iron to the diet of the young and growing child is not only rational but is of particular value in preventing anæmia of early infancy.

TRADE MARK 'KEPLER' COD LIVER OIL WITH MALT EXTRACT AND CHEMICAL FOOD

Chemical Food *(Phosphates Compound)*, an excellent general tonic for children and adults, is here presented in a most palatable form.

TRADE MARK 'KEPLER' COD LIVER OIL WITH MALT EXTRACT AND CREOSOTE

In this preparation the therapeutic efficiency of creosote is augmented by presence of cod liver oil.

TRADE MARK 'KEPLER' COD LIVER OIL WITH MALT EXTRACT AND HYPOPHOSPHITES

The hypophosphites are unstable and deliquescent salts. They are best presented in conjunction with 'Kepler' Cod Liver Oil with Malt Extract, which conserves their chemical properties and masks their unpleasant taste.

TRADE MARK 'KEPLER' MALT EXTRACT WITH GLYCEROPHOSPHATES

'Kepler' Malt Extract provides an ideal vehicle for the administration of the glycerophosphates of calcium, potassium, sodium and magnesium. This combination is very acceptable when taken with milk.

TRADE MARK 'KEPLER' MALT EXTRACT WITH HÆMOGLOBIN

'Kepler' Malt Extract with Hæmoglobin contains gr. 8-3/4 (0·567 gm.) 'Wellcome' Brand Hæmoglobin in each fluid ounce. In this form the hæmoglobin is without irritant action.

For further 'Kepler' Products, see Wellcome's Medical Diary or Excerpta Therapeutica

VITAMIN B

'Ryzamin-B' Brand Rice Polishings Concentrate

'RYZAMIN-B,' which consists of the concentrated and purified vitamin-containing fraction of rice polishings (recognised as a rich source of Vitamin B), has a potency of not less than 50 International Units of Vitamin B_1 per gramme. Thus it is possible to add to the diet an adequate supply of the anti-neuritic factor in a relatively small bulk. Doses of Vitamin B_1, which could not be tolerated by many patients in the form of natural foods, may thus be given with safety.

Vitamin B_1 is stated to promote appetite, to aid digestion and to bring about increased tonicity and absorptive powers of the digestive tract; it stimulates the general metabolic processes, promoting growth, and acts as a valuable prophylactic against polyneuritis. It is stated to be necessary for normal reproduction and lactation.

Primary Use

'RYZAMIN-B' is suggested, primarily, as a dietary reinforcement for patients of all ages, to stimulate appetite and promote utilisation of food; secondly, where there is anorexia and loss of weight, as may occur after prolonged fevers and in chronic wasting diseases. The concentrate is of unquestionable value in cases where whole-wheat bread is omitted from the diet. To supplement the diet in partial deficiencies, a daily dose of 0·4 gramme (6 grains approx.) of the concentrate is suggested. In the case of infants and young children,

0·1 gramme (1-1/2 grains approx.) or more, according to age, may be given daily. It may be dissolved and mixed in the baby's feedings, if so desired.

In serious conditions (beri-beri and late sprue), a daily dosage of 4 grammes (60 grains), or even larger doses of 'Ryzamin-B' may be given in safety.

'RYZAMIN-B' is a clear, golden-brown, syrupy preparation, quite palatable and readily taken by children.

VITAMIN C

A diet deficient in Vitamin C results in the development of scurvy both in man and animals. Scurvy develops gradually with loss of weight, listlessness, anæmia with hæmorrhages into the mucous membranes and skin, œdema and osteoporetic condition of the bones. Infantile scurvy is a relatively modern condition. In 1894, Barlow described a disease of infants (scurvy-rickets) which is known to be a complication of rickets with a Vitamin C deficiency. The anti-scorbutic value of both cows' milk and human milk falls to a low level in many modern systems of diet. It is possible that Vitamin C may, in time, be proved to be an interesting exception to the generalisation that animals are unable to synthesise vitamins. Rats and pigeons, when fed on a diet deficient in Vitamin C, grow and reproduce in an approximately normal manner and scurvy does not develop. There is some reason to believe that the necessary amount of this vitamin may be produced by these animals. Man and the guinea-pig are relatively very susceptible to lack of Vitamin C.

Ascorbic Acid

It has been shown that the anti-scorbutic properties of fresh fruit and vegetables are due to the presence of a substance at one time believed to be "hexuronic acid," but now known to be hexuronic acid less a molecule of water and recently renamed ascorbic or cevitamic acid. It has been isolated as a fine crystalline substance from peppers, oranges, lemons, cabbages and other vegetable sources, and also from the cortex of the suprarenal gland. It has also been produced synthetically and is available as 'TABLOID' ASCORBIC ACID.

VITAMIN D

It is now established that exposure of ergosterol, a sterol occurring in certain natural fats, to ultra-violet light gives rise to a product—irradiated ergosterol—having a very intense anti-rachitic activity. Irradiated ergosterol, by treatment with dinitrobenzoyl chloride, gives a mixture of dinitro-esters from which calciferyl dinitrobenzoate can be separated. The latter, on hydrolysis, forms the pure crystalline anti-rachitic principle with a constant activity of 40,000 units per mgm. The pure substance is known as calciferol. Available evidence* clearly indicates that ergosterol is not the only naturally occurring precursor of an anti-rachitic substance, and that the anti-rachitic activity of cod liver oil is due to a substance which is different from, although perhaps related to, calciferol.

* Edgar Stedman: Reports of the Progress of Applied Chemistry, xx, 665, 1935.

VITAMIN A

Carotene

Carotene is a yellow pigment found in carrots, cabbages, tomatoes, butter, eggs, etc. It is a mixture of closely related substances such as α-, β- and γ-Carotene, β-hydroxycarotene and dihydrocarotene. In the animal body these pigments are readily converted into the colourless Vitamin A. Deficiency of the latter may therefore be remedied by the administration of the vitamin or its precursor Carotene. Vitamin A deficiency is said to be associated to a limited extent with a lowering of resistance to the invasion of organisms. The Report* of the Second International Conference, 1934, on Vitamin Standardisation of the League of Nations (Health Organisation) adopted pure β-Carotene as the International Standard for Vitamin A.

Rat fed on diet devoid of Vitamin A. Shows xerophthalmia, rough coat and general lack of condition.

* Medical Research Council IV: The Standardisation and Estimation of Vitamin A, 1935.

Names	Results of Deficiency
Vitamin A Terpene derivative Carotene carotenoid pigment Soluble in oils and fats	Epithelial metaplasia; xerophthalmia and night blindness; dysfunction of salivary glands, atrophy and necrosis of intestinal villi and mucus cells; keratinisation of upper respiratory epithelium. Renal and septic calculi. Cutaneous lesions and keratosis. Degenerative changes in nervous system.
Vitamin B_1 (F) Aneurin Thiamine Pyrimidine-thiazole compound Soluble in water	Beri-beri ("wet" and "dry" forms); polyneuritis, paralysis, convulsions. Digestive dysfunction; anorexia, gastric lesions and atony; ulcerative colitis. Bradycardia with fatty degeneration. Metabolic failure (carbohydrate) and retarded growth.
Vitamin B_2 (G) Riboflavin Flavin pigment Soluble in water Anti-dermatitis factor (Vitamin H—B_6) Pellagra-preventive factor Extrinsic pernicious anæmia factor B_3–B_4–B_5W factors	Poor growth, alopecia, cataract. Florid dermatitis; acrodynia. Pellagra; canine black tongue (stomatitis). Sprue; glossitis; stomatitis; cœliac disease; pernicious anæmia; macrocytic anæmia. Ill-defined growth factors.
Vitamin C Ascorbic Acid Cevitamic Acid Hexuronic Acid (hexose derivative) Soluble in water	Scurvy; Hæmorrhagic diathesis; hæmorrhages of skin, joints and mucous membrane; spongy bleeding gums; dental lesions and beaded ribs; painful swollen joints; gingivitis; weakness.
Vitamin D Viosterol—irradiated ergosterol Calciferol—crystalline Vitamin D Sterol derivative Soluble in oils and fats	Rickets. Faulty absorption, retention and deposition of the bone-forming elements—calcium and phosphorus—in the body. Enlargement of joints. Lesions of bone and teeth. Muscular weakness. Tetany. Osteomalacia, osteoporosis.
Vitamin E α-Tocopherol A complex alcohol Soluble in oils and fats	Sterility; placental dysfunction; gestational failure; habitual abortion.
Vitamin K (associated with Vitamin C)	Hæmorrhages; lack of prothrombin.

CALCIUM REQUIREMENTS

During pregnancy or lactation the administration of calcium is essential when it is considered that the dietary calcium is insufficient to meet the demands of the growing fœtus or infant. There is ample evidence to suggest that the normal absorption of calcium can proceed only if there is an adequate supply of Vitamin D, which appears to prevent the calcium from being precipitated in an insoluble form. It is probable that deficiency of Vitamin D renders the intestinal contents more alkaline than normal, and in this manner interferes with the absorption of the calcium. Further, if the amount of Vitamin D is inadequate and calcium is administered in excess, the calcium-phosphorus balance is upset and the absorption of both substances is impaired.

TRADE MARK 'TABLOID' BRAND

CALCIUM GLUCONATE

Calcium Gluconate [$Ca(C_6H_{11}O_7)_2.H_2O$] is a calcium salt of gluconic acid, containing approximately 9 per cent. of calcium. It may be administered whenever calcium therapy is indicated. The calcium, which is in combination with the relatively weak gluconic acid, is presented in an ideal condition for proper calcium metabolism.

'TABLOID' BRAND CALCIUM GLUCONATE, gr. 20 *(Chocolate-flavoured Base)*, consists of pure calcium gluconate combined with a suitable quantity of chocolate as flavouring. It is readily absorbed and does not upset the digestion. Each product should be masticated and a glassful of water taken immediately afterwards. To ensure adequate absorption of the calcium ion, the product should be taken during the inter-digestive periods when the intestinal reaction is least alkaline.

TRADE MARK 'TABLOID' BRAND CALCIUM GLUCONATE WITH CALCIFEROL

'TABLOID' BRAND CALCIUM GLUCONATE WITH CALCIFEROL presents Calcium Gluconate and Calciferol as an acceptable and easily assimilable combination. It not only ensures that the dietary calcium is sufficient for metabolic purposes, but provides a full Vitamin D content in the diet. The 'Tabloid' products should be masticated and a full glass of water taken immediately afterwards.

TRADE MARK 'TABLOID' BRAND CALCIUM GLUCONATE AND IRON EFFERVESCENT

'TABLOID' BRAND CALCIUM GLUCONATE AND IRON provides a ready means of meeting the physiological demands for calcium and iron in all cases where it is suspected that these are not adequately met in the dietary, and where deficiency has not attained the magnitude of a clinical condition. It is intended for treatment in those cases where calcium and iron deficiencies are suspected, and not necessarily when clinical anæmia has become apparent. It is particularly indicated for use as a means of supplying the increased physiological demands for iron and calcium, conditioned by pregnancy and menstruation. In pre-natal cases, one product is dissolved in a tumblerful of water, twice a day for a month; treatment is resumed after the lapse of another month and thereafter as indicated. Alternatively, one product may be taken once a day during many months. For cases of suspected calcium and iron deficiency, one or two a day may be taken for prolonged periods. Large doses may be given in districts where water is abnormally deficient in calcium salts. When dissolved in a small tumblerful of water, it forms a palatable, effervescent draught and thus tends to increase the daily intake of water.

TRADE MARK 'HYPOLOID' BRAND CALCIUM LÆVULATE

Calcium Lævulate is the calcium salt of lævulic acid, an acid obtained from glucose, lævulose and other sugars. The calcium content is relatively high, calcium lævulate containing 14·8% of calcium, or 50% more than calcium gluconate.

Calcium Lævulate is of particular value for intravenous injection, as ulceration or other undesirable effects do not appear to follow accidental extravasation. It has the further advantages that it is readily sterilised and is non-toxic in therapeutic doses.

'HYPOLOID' BRAND CALCIUM LÆVULATE is the preparation of choice for effective calcium medication by injection. It is a sterile, stable and non-irritating solution, and may be administered intramuscularly or subcutaneously in divided doses of 5 c.c. each, at different points, if the intravenous route is not practicable.

PREPARATIONS

TRADE MARK 'KEPLER' PRODUCTS [SEE LIST B. W. & Co.]

'KEPLER' COD LIVER OIL

Prices in London: Bottles of 8 *fl. oz.* (2/6) *and* 16 *fl. oz.* (4/0) *per bottle*

,, COD LIVER OIL WITH MALT EXTRACT

Prices in London: 2/1 *and* 3/8 *per bottle*

,, COD LIVER OIL WITH MALT EXTRACT AND CHEMICAL FOOD *(Phosphates Compound)* ... ... in bottles

Each fluid ounce contains: Iron Phosphate, gr. 2 [0·13 gm.]; Calcium Phosphate, gr. 3 [0·194 gm.]; Sodium Phosphate, gr. 1/4 [0·016 gm.]; and Potassium Phosphate, gr. 1/4 [0·016 gm.].

Price in London: 2/6 *per bottle*

,, COD LIVER OIL WITH MALT EXTRACT AND CREOSOTE

Each fluid ounce contains: Creosote, min. 4 [0·237 c.c.]. in bottles

Price in London: 2/6 *per bottle*

,, COD LIVER OIL WITH MALT EXTRACT AND HYPOPHOSPHITES ... ... in bottles of two sizes

Each fluid ounce contains: Calcium Hypophosphite, gr. 4 [0·259 gm.]; Potassium Hypophosphite, gr. 2 [0·13 gm.]; and Sodium Hypophosphite, gr. 2 [0·13 gm.]. *Prices in London:* 2/6 *and* 4/7 *per bottle*

,, COD LIVER OIL WITH MALT EXTRACT AND IRON IODIDE ... ... in bottles

Each fluid ounce contains: Iron Iodide, gr. 2 [0·13 gm.].

Price in London: 2/6 *per bottle*

One teaspoonful to two dessertspoonfuls of any of the above 'Kepler' Cod Liver Oil combinations may be given, twice or thrice daily, after food

'KEPLER' MALT EXTRACT

Prices in London: 2/1 *and* 3/8 *per bottle*

,, WITH CHEMICAL FOOD *(Phosphates Compound)* in bottles

Each fluid ounce contains: Iron Phosphate, gr. 2 [0·13 gm.]; Calcium Phosphate, gr. 3 [0·194 gm.]; Sodium Phosphate, gr. 1/4 [0·016 gm.]; and Potassium Phosphate, gr. 1/4 [0·016 gm.].

Price in London: 2/6 *per bottle*

,, WITH GLYCEROPHOSPHATES in bottles of two sizes

Each fluid ounce contains: Calcium Glycerophosphate, gr. 4 [0·259 gm.]; Potassium Glycerophosphate, gr. 2 [0·13 gm.]; Sodium Glycerophosphate, gr. 2 [0·13 gm.]; and Magnesium Glycerophosphate, gr. 2 [0·13 gm.].

Prices in London: 2/6 *and* 4/7 *per bottle*

,, WITH HÆMOGLOBIN ... ... in bottles

Each fluid ounce contains: Hæmoglobin, gr. 8-3/4 [0·567 gm.].

Price in London: 2/6 *per bottle*

,, WITH HYPOPHOSPHITES ... in bottles of two sizes

Each fluid ounce contains: Calcium Hypophosphite, gr. 8 [0·518 gm.]; Potassium Hypophosphite, gr. 4 [0·259 gm.]; and Sodium Hypophosphite, gr. 4 [0·259 gm.].

Prices in London: 2/6 *and* 4/7 *per bottle*

,, WITH IRON IODIDE ... ... in bottles

Each fluid ounce contains: Iron Iodide, gr. 2 [0·13 gm.].

Price in London: 2/6 *per bottle*

,, WITH PEPSIN AND PANCREATIN ... ... in bottles

Each fluid ounce contains: Pure Pepsin and Pure Pancreatin, of each, gr. 4 [0·259 gm.].

Price in London: 2/6 *per bottle*

One teaspoonful to two dessertspoonfuls of any of the above 'Kepler' Malt Extract combinations may be given, twice or thrice daily, with or immediately after food

VITAMIN CONCENTRATES

VITAMIN A

TRADE MARK 'TABLOID' BRAND CAROTENE, 0·002 gramme *(sugar-coated)* [SEE LIST B. W. & Co.]

DIRECTION.—One to five products, according to age, three times a day.

Price in London: Bottles of 25, *at* 3/6 *per bottle*

VITAMIN B

TRADE MARK 'RYZAMIN-B' BRAND RICE POLISHINGS CONCENTRATE [SEE LIST B. W. & Co.]

DIRECTION.—*For Adults and Children.*—One measureful daily, or more frequently, as indicated.

Prices in London: Tubes of 15 *gm. (with Nozzle), at* 1/10 *per tube*; *and tubes of* 100 *gm. (with Nozzle), at* 10/0 *per tube*

A special measuring spoon is issued with each packing.

VITAMIN C

TRADE MARK 'TABLOID' BRAND ASCORBIC ACID, 0·005 gramme; and 0·025 gramme [SEE LIST B. W. & Co.]

DIRECTION.—One or more, of either strength, according to the severity of the condition.

Prices in London: 0·005 *gm., bottles of* 25, *at* 2/0 *per bottle*; 0·025 *gm., bottles of* 25, *at* 4/6 *per bottle*

VITAMIN D

TRADE MARK 'TABLOID' BRAND CALCIFEROL, 0·0001 gramme (=4000 International Units); and 0·00025 gramme (=10,000 International Units) [SEE LIST B. W. & Co.]

DIRECTION.—One, or more, of the lesser strength, daily, as a prophylactic and as a supplement to cod liver oil in the treatment of rickets. In serious and intractable cases, the 0·00025 gm. strength is given once or twice daily. For administration to children, the products may be powdered in a little water or milk, or added to the child's food. Older children or adults may take the products with a draught of water.

Prices in London: 0·0001 *gm., bottles of* 25 (1/10) *and* 100 (5/11); 0·00025 *gm., bottles of* 25 (3/9) *and* 100 (13/2) *per bottle*

CALCIUM MEDICATION

TRADE MARK 'TABLOID' BRAND CALCIUM GLUCONATE, gr. 20 [1·296 gm.] *(Chocolate-flavoured Base)* [SEE LIST B. W. & Co.]

DIRECTIONS.—*Adults*—two to three products, three times a day, before food. *Children*—one product, three times a day, before food.

Price in London: Tubes of 25, *at* 1/10 *per tube*

TRADE MARK 'TABLOID' BRAND CALCIUM GLUCONATE WITH CALCIFEROL [SEE LIST B. W. & Co.]

Each contains: Calcium Gluconate, 0·325 gm., and Calciferol, 0·000025 gm. (1000 International Units Vitamin D in each product).

DIRECTION.—One, or more, to be taken with water, daily, as a prophylactic.

Prices in London: Bottles of 25 (1/10) *and* 100 (5/11) *per bottle*

TRADE MARK 'TABLOID' BRAND CALCIUM GLUCONATE AND IRON (EFFERVESCENT) [SEE LIST B. W. & Co.]

℞ Calcii Gluconatis,	gr. 20 [1·296 gm.]
Ferri et Ammonii Citratis,	gr. 3 [0·194 gm.]
Salis Effervescentis,	*q.s.*

DIRECTION.—One to two products, daily, in a large tumblerful of water.

Price in London: Tubes of 20, *at* 2/1 *per tube*

TRADE MARK 'HYPOLOID' BRAND CALCIUM LÆVULATE, 1 gramme [gr. 15-1/2 approx.], in 10 c.c. [SEE LIST B. W. & Co.]

DIRECTIONS.—*Adults*—10 c.c. may be given intramuscularly, intravenously or subcutaneously daily or every second day. *Children*—2 c.c. to 5 c.c., according to age, intramuscularly, intravenously or subcutaneously.

Price in London: Boxes of 5 *'Hypoloid' ampoules*, 5/6 *per box*

BURROUGHS WELLCOME & CO.
(THE WELLCOME FOUNDATION LTD.)
LONDON (ENG.)

Associated Houses:

NEW YORK MONTREAL SYDNEY CAPE TOWN MILAN
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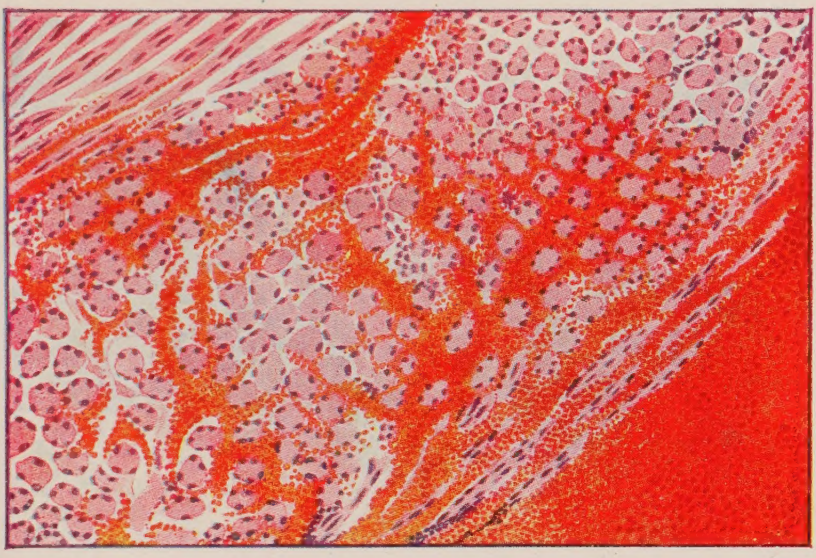
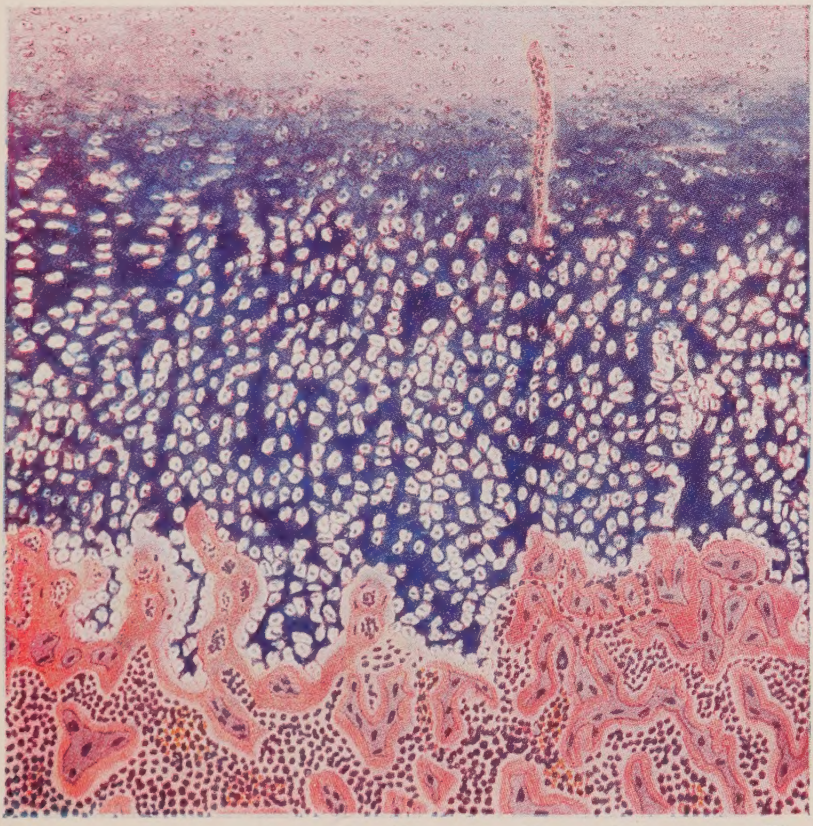


Arterial degeneration due to Vitamin C deficiency. The illustration shows hæmorrhage into a muscle



Calcium changes due to Vitamin D deficiency. The illustration shows absence of calcification of cartilage